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U. S. DEPARTMENT OF AGRICULTURE

REPORT OF THE FEDERAL HORTICULTURAL BOARD.

UNITED STATES DEPARTMENT OF AGRICULTURE,
FEDERAL HORTICULTURAL BOARD,
Washington, D. C., October 3, 1916.

SIR: I submit herewith an executive report covering the administration of the plant quarantine act for the fiscal year ending June 30, 1916.

Respectfully,

C. L. MARLATT,
Chairman of Board.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

FEDERAL PLANT QUARANTINE ACT.

Under the Federal plant quarantine act of August 20, 1912, as amended March 4, 1913, the entry of foreign nursery stock and other plants and plant products into the United States is regulated, and domestic and foreign quarantines on account of plant diseases and insect pests are established and maintained.

ADMINISTRATION AND PERSONNEL.

FEDERAL HORTICULTURAL BOARD.

The personnel of the Federal Horticultural Board remains the same as last year, namely: C. L. Marlatt, chairman, Bureau of Entomology; W. A. Orton, vice chairman, Bureau of Plant Industry; George B. Sudworth, Forest Service; W. D. Hunter, Bureau of Entomology; Karl F. Kellerman, Bureau of Plant Industry. R. C. Althouse, secretary of the board, has charge of the administrative office. J. H. Batt, of the administrative office, has charge of cotton importations.

FEDERAL AND STATE INSPECTION SERVICE.

No material change has been made in the Federal and State inspection service, the Federal work having been under the charge of Messrs. E. R. Sasscer and R. Kent Beattie. The number of State expert inspectors appointed as collaborators was slightly increased during the year owing to the establishment by the State Plant Board of Florida of a port-inspection service, and we now have a collaborator at each of the principal maritime ports of entry in that State. The inspection of plant importations entered at the port of New York from countries without inspection service, and also of potatoes and avocados offered for entry under the regulations requiring inspection at this port, where the great bulk of importations are entered, has been continued by Mr. H. B. Shaw. During the year cotton has also been added to the products requiring inspection, necessitating a permanent inspection force at Boston, where the bulk of the cotton enters, and a considerable increase of this work at New York, N. Y., Newark, N. J., and San Francisco, Cal.

COOPERATION WITH OTHER DEPARTMENTS.

The State Department and the Treasury Department have continued their hearty cooperation in the enforcement of the foreign quarantines, while the Post Office Department has rendered efficient service in the enforcement of both the foreign and domestic quarantines.

While the orders of the Post Office Department, issued at the request of this department, prohibiting the importation of nursery stock and cotton by mail, have been given wide publicity and are now quite generally observed, occasional shipments of nursery stock and cotton are still sent to this country by mail, only to be promptly returned by the postal officials to the point of origin.

TERMINAL INSPECTION OF INTERSTATE MAIL SHIPMENTS OF PLANTS AND PLANT PRODUCTS.

During the year the States of Arizona and Montana availed themselves of the provisions of the act of March 4, 1915, by providing for terminal inspection of mail shipments of plants and plant products originating in other States. California made similar provision last year. All shipments by mail to these States of florists' stock, trees, shrubs, vines, cuttings, grafts, scions, buds, fruit pits and other seeds of fruit and ornamental trees or shrubs, and other plants or plant products in the raw or unmanufactured state, except vegetable and flower seeds, are now subject to inspection by State officials before delivery to the addressee. All plants and plant products shipped under the certification of the Federal Horticultural Board, however, are exempted from such inspection.

REVIEW OF THE WORK OF THE YEAR.

NEW PLANT QUARANTINES.

The domestic and foreign quarantines described below are additional or supplementary to the quarantines previously established.

FOREIGN QUARANTINES.

WHITE-PINE BLISTER RUST QUARANTINE.—Amendment 1 to Quarantine No. 7, promulgated February 29, 1916, forbids the importation into the United States from the Dominion of Canada and Newfoundland of all five-leaved pines and all species and varieties of the genera *Ribes* (currants) and *Grossularia* (gooseberries), known to be intermediate host plants, to prevent the further introduction into the United States of the white-pine blister rust.

INDIAN CORN.—Quarantine No. 24, promulgated April 29, 1916, effective on and after July 1, 1916, amends and supersedes Quarantine No. 21, promulgated March 8, 1915, and prohibits the importation into the United States in the raw or unmanufactured state from Southeastern Asia (including India, Siam, Indo-China, and China), Malayan Archipelago, Australia, New Zealand, Oceania, Philippine Islands, Formosa, Japan, and adjacent islands, of seed and all other portions of Indian corn or maize (*Zea mays* L.), and the closely related plants, including all species of teosinte (*Euchlaena*), Job's tears (*Coix*), *Polytoca*, *Chionachne*, and *Sclerachne*, to prevent the introduction into the United States of certain very serious corn diseases. One of these diseases, *Peronospora maydis*, is, so far as known, limited to maize. It attacks the young plants, causing great damage, in some parts of Java. The disease caused by *Sclerospora sacchari*, first described from Formosa but known to occur also in the Fiji Islands

and Queensland, is also a very destructive parasite which in favorable seasons completely prevents corn from developing any fruit in Formosa. Unlike the Java corn disease, the Queensland leaf stripe disease attacks also sugar cane, upon which it is a destructive parasite. Other mildews seriously destructive to corn occur in British India and in the Philippines. All of these downy mildews are favored by warm, moist weather, such as is considered to be ideal corn-growing weather in the Mississippi Valley; and if these diseases should reach this country and become established in the Mississippi Valley, they would probably cause enormous damage to our most valuable crop.

DOMESTIC QUARANTINES.

HAWAIIAN COTTON.—Quarantine No. 23, revised, promulgated February 11, 1916, effective on and after February 16, 1916, amends and supersedes Quarantine No. 23, promulgated June 11, 1915. This quarantine forbids the movement from Hawaii into or through any other State, Territory, or District of the United States of raw or unmanufactured cotton, except in accordance with the regulations prescribed therein, with the object of preventing the introduction into the continental United States of the pink boll worm (*Gelechia gossypiella* Saund).

GIpsy Moth and Brown-Tail Moth Quarantine.—Quarantine No. 25, promulgated May 22, 1916, was originally issued November 5, 1912, as Quarantine No. 4, and has been revised and amended annually to embody the annual revision of the territory necessitated on account of the changes in distribution of these two insects. This quarantine defines the districts in New England infested by the gipsy moth and the brown-tail moth, and prohibits the movement in interstate commerce of plants and plant products except in accordance with the regulations prescribed therein. The spread of the brown-tail moth during the year was so slight that it was unnecessary to extend the quarantine line on account of this pest. The spread of the gipsy moth was considerably less extensive than last year.

The inspection and certification of Christmas trees and Christmas greens from the area infested by the gipsy moth was undertaken last year for the first time. The amount of such material for which inspection and certification was requested was much less than had been expected. The authorities of the States of New York and Ohio were, however, unwilling to receive such certified Christmas trees and Christmas greens, and established quarantines against such material originating in the area infested by the gipsy moth, taking this action both on account of the difficulty of inspecting such trees and greens on arrival at destination and as an expression of lack of confidence in any inspection of such masses of material. In point of fact, however, no gipsy-moth infestation has been found on any of the certified Christmas material shipped from infested districts. All shipments of certified products from the areas quarantined on account of the gipsy moth and the brown-tail moth to points outside of these areas are being reported to the proper officials of the States receiving such shipments, so that at destination reinspection may be made by State inspectors if desired.

As in former years, the cost of administering this quarantine was paid out of the special appropriation for preventing spread of moths granted to the Bureau of Entomology.

THE WHITE-PINE BLISTER RUST.

The white-pine blister rust, a most destructive disease affecting five-leaved pines, was the subject of the first quarantine issued under the authority of the plant quarantine act. This quarantine prohibited the entry of certain pines from certain countries in Europe. The increased knowledge of the foreign distribution of this disease made it necessary to revise this quarantine and it was reissued as Quarantine No. 7, May 21, 1913, forbidding the importation into the United States of all five-leaved pines from every country of Europe and Asia. Prior to this quarantine action this disease had gained foothold in New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, New Jersey, Ohio, and Indiana, and it is now known to occur in all of these States except Ohio, Indiana, and New Jersey. In the meantime it had also obtained considerable foothold in Canada.

The States invaded by the white-pine blister rust have been actively engaged for several years, in cooperation with this department, in an endeavor to stamp out the disease, and this action has apparently been successful in the three States last named. The occurrence of this disease in Canada and the fact that its alternate host includes the genera *Ribes* and *Grossularia* necessitated an amendment to Quarantine Notice No. 7. This amendment was promulgated February 29, 1916, forbidding the importation into the United States from the Dominion of Canada and Newfoundland of all five-leaved pines and of all species and varieties of *Ribes* and *Grossularia*.

At the request of the State forester of New York an informal conference was held by the Federal Horticultural Board July 20 with various other State foresters and State nursery inspectors to discuss the white-pine blister rust situation in the United States. The object of the conference was to hear the latest reports on the distribution of the disease and to discuss methods of concerted action by the States and the United States Department of Agriculture in the eradication of this disease.

It developed that the white-pine blister rust was more widespread in the East than had been realized, and it was feared that unless some regulatory action was taken the disease would get beyond control. A public hearing was accordingly held February 4, 1916, to determine the best means of preventing further spread of this disease in this country. Following the hearing, as already noted, a prohibition was placed on the importation of all five-leaved pines and all species and varieties of the genera *Ribes* and *Grossularia* from the Dominion of Canada and Newfoundland.

In view of the known wide shipments of supposedly diseased five-leaved pines from Germany, prior to the establishment of the original quarantine in 1912, it was realized that there was a strong probability that the white-pine blister rust is much more widely distributed in the Mississippi Valley States than has been so far disclosed by inspection. This point of view has since been confirmed by the finding of infections in Wisconsin and Minnesota. The uncertainty as to the distribution of the disease in the United States made it impracticable to take any quarantine action until a thoroughgoing field survey had been made. Such a field survey the Bureau of Plant Industry agreed to undertake at once in cooperation with the board, and this survey is now in progress.

The five-leaved pine districts of the eastern United States have already been invaded or the disease has become so widespread that the further protection of such areas by quarantine is impracticable. There remained, however, the vast five-leaved pine areas of the Rocky Mountain and Pacific slope regions so far uninvaded by this disease and the problem was particularly to protect this area from infection if possible. Inasmuch as no definite quarantine lines could be drawn, the alternative was taken of securing a voluntary agreement from all the nurserymen in the Eastern and Mississippi Valley States not to ship any white pine, currant, or gooseberry stock west of the western line of the following tier of States: North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.

LIFTING OF QUARANTINES ON ACCOUNT OF POWDERY SCAB.

The domestic quarantine on account of powdery scab of potatoes was lifted, effective September 1, 1915, by an order issued by the Secretary of Agriculture, August 30, 1915. This action was taken as a result of a thoroughgoing survey conducted by the board of all the principal potato-growing regions of the United States which had been subject to possible contamination by the receipt of seed potatoes from infected districts in Maine and New York or from foreign sources either prior to the establishment of a quarantine or as a result of the movement of certified potatoes. This survey indicated conclusively that the disease is limited by climatic conditions and normally is to be feared only in restricted localities of the northern areas of the United States. The survey made by the board in cooperation with the Bureau of Plant Industry of this department has determined that the disease now occurs, in addition to the previously known regions in Maine and northern New York, in three places in Oregon, one in the State of Washington and five in Minnesota. In view of the impracticability of determining by inspection the complete absence of the disease from commercial shipments of potatoes and the apparently little danger from the shipment of such potatoes to the principal regions where these potatoes find their known markets for food or seed purposes, it was deemed that there was not adequate justification for the continuance of the quarantine restrictions on the movement of potatoes from the infected districts.

A corresponding order lifting the foreign quarantine on account of powdery scab was promulgated December 8, 1915, effective January 1, 1916.

NURSERY-STOCK IMPORTATIONS.

The system of control of imported nursery stock established during the first year of the enforcement of the plant-quarantine act has been continued without material change.

The regulations were revised, effective July 1, 1916. The most important change is the provision that permits to import nursery stock from countries which maintain nursery-stock inspection, and permits to import orchids and tree seeds from countries which do not maintain nursery-stock inspection, instead of being reissued each year as hitherto, will be valid until revoked. This will result in a great saving of clerical labor, and will otherwise facilitate matters both for this office, the offices of the collectors of customs, and the importers and foreign shippers as well.

FOREIGN COUNTRIES MAINTAINING INSPECTION SERVICE.

The following countries have provided for inspection and certification in conformity with the regulations prescribed under the plant-quarantine act:

| | | |
|-----------------|--------------------------|------------------------|
| Australia. | Ireland. | New Zealand. |
| Barbados. | Italy—Province of Padova | Philippine Islands. |
| Belgium. | (Padua) only. | Scotland. |
| Bermuda. | Jamaica. | Union of South Africa. |
| British Guiana. | Japan. | Spain. |
| Canada. | Leeward Islands: | Straits Settlements. |
| Cuba. | Antigua. | Switzerland. |
| Denmark. | St. Christopher-Nevis. | Trinidad. |
| England. | Dominica. | Wales. |
| France. | Montserrat. | Windward Islands: |
| Germany. | Virgin Islands. | Granada. |
| Guatemala. | Luxemburg, Grand Duchy | St. Lucia. |
| Holland. | of. | St. Vincent. |

This list includes practically all of the countries which have hitherto maintained any considerable commercial trade in nursery stock with the United States. Any other country may obtain the privilege of commercial exportation to the United States by providing an inspection service.

In general, both importers and exporters of nursery stock have endeavored to comply with the law and to meet all of its requirements. In only one instance was it necessary to revoke permits for the importation of nursery stock due to the infested condition of the stock.

DISTRIBUTION OF IMPORTED NURSERY STOCK, BY STATES.

The following table indicates the distribution by States of nursery stock imported during the fiscal years 1914-15 and 1915-16. It will be noted that in spite of the disturbed conditions in Europe there has been a considerable increase in the amount of nursery stock imported this year over last.

Distribution of imported nursery stock, by States.

| State. | Number of cases. | | State. | Number of cases. | |
|---|------------------|---------|---------------------|------------------|---------|
| | 1915-16 | 1914-15 | | 1915-16 | 1914-15 |
| Alabama..... | 284 | 241 | Montana..... | 32 | 20 |
| Arkansas..... | 22 | 95 | Nebraska..... | 249 | 217 |
| California..... | 2,403 | 3,357 | Nevada..... | | 1 |
| Colorado..... | 152 | 150 | New Hampshire..... | 44 | 53 |
| Connecticut..... | 1,972 | 1,372 | New Jersey..... | 13,295 | 8,829 |
| Delaware..... | 53 | 40 | New York..... | 16,325 | 12,669 |
| District of Columbia ¹ | 491 | 549 | North Carolina..... | 121 | 80 |
| Florida..... | 1,466 | 2,461 | North Dakota..... | 56 | 12 |
| Georgia..... | 191 | 228 | Ohio..... | 3,314 | 3,374 |
| Hawaii..... | 57 | 20 | Oklahoma..... | 17 | 15 |
| Idaho..... | 4 | 5 | Oregon..... | 355 | 480 |
| Illinois..... | 4,671 | 3,316 | Pennsylvania..... | 6,096 | 6,556 |
| Indiana..... | 577 | 569 | Rhode Island..... | 562 | 741 |
| Iowa..... | 905 | 1,066 | South Carolina..... | 41 | 39 |
| Kansas (north)..... | 55 | 51 | South Dakota..... | 29 | 16 |
| Kansas (south)..... | 292 | 292 | Tennessee..... | 185 | 197 |
| Kentucky..... | 410 | 320 | Texas..... | 151 | 139 |
| Louisiana..... | 279 | 400 | Utah..... | 25 | 27 |
| Maine..... | 65 | 42 | Vermont..... | 41 | 24 |
| Maryland..... | 595 | 756 | Virginia..... | 379 | 354 |
| Massachusetts..... | 4,769 | 4,221 | Washington..... | 421 | 403 |
| Michigan..... | 1,325 | 1,562 | West Virginia..... | 87 | 87 |
| Minnesota..... | 746 | 701 | Wisconsin..... | 509 | 430 |
| Mississippi..... | 21 | 23 | | | |
| Missouri..... | 513 | 592 | Total..... | 64,652 | 57,192 |

¹ In addition to the commercial shipments referred to, some 4,600 departmental importations for scientific purposes have been inspected by inspectors of the Federal Horticultural Board.

COUNTRY OF ORIGIN AND NATURE OF NURSERY-STOCK IMPORTATIONS.

Country of origin and classes of plants and seeds imported during the year ended June 30, 1916.

| Country. | Fruit-trees. | Fruit-tree stocks. | Grape-vines. | Bush fruits. | Roses. | Rose stocks. | Forest and ornamental deciduous trees. | Ornamental deciduous shrubs. |
|------------------|--------------|--------------------|--------------|--------------|-----------|--------------|--|------------------------------|
| Azores..... | 2 | | | | 35 | | 50 | |
| Belgium..... | 305 | | | | 1,223 | | 3,158 | 23,818 |
| Bermuda..... | | | 3 | | 5 | | | |
| Canada..... | 58 | | | 780 | 3,544 | | 8 | |
| Cuba..... | | | 15 | | 1 | | 50 | |
| Denmark..... | 300 | | | | 25,525 | | | 4,152 |
| England..... | 4,301 | 24 | 362 | 70,218 | 414,174 | 1,947,800 | 317,328 | 20,895 |
| France..... | 2,458,194 | 20,356,416 | 8,653 | 31,225 | 180,461 | 2,217,804 | 1,283,817 | 2,773,821 |
| Holland..... | 267,382 | 160,025 | 157 | 33,705 | 2,375,823 | 1,065,360 | 465,098 | 1,337,606 |
| Ireland..... | 150,000 | | | 18 | 104,201 | 257,500 | | 393 |
| Italy..... | 255,007 | | 25 | | | | 245 | 277 |
| Japan..... | 12,262 | 10,548 | 300 | 1,092 | 23 | | 26,240 | 31,210 |
| Norway..... | | | | | 225 | | | |
| Scotland..... | 384 | | 71 | 12,591 | 17,984 | 389,500 | 15,462 | 5,325 |
| Switzerland..... | | | | | | | | 6 |
| Trinidad..... | | | | | | | 90 | |
| Total..... | 3,148,195 | 20,527,013 | 9,586 | 149,629 | 3,123,224 | 5,877,964 | 2,111,546 | 4,197,503 |

| Country. | Coniferous trees other than pines. | Pines. | Evergreen trees. | Evergreen shrubs. | Field-grown florists' stock. | Stocks, cuttings, or seedlings. | Tree seeds. |
|--------------------------|------------------------------------|--------|------------------|-------------------|------------------------------|---------------------------------|--------------------------|
| Australia..... | | | | 3 | 25 | | <i>Pounds.</i> 28,800 |
| Azores..... | | | | 59 | 2 | 23 | |
| Belgium..... | 89,359 | | 3,649 | 834,338 | 110,014 | | 20 |
| Bermuda..... | 2 | | | 2,800 | 19,046 | 3,300 | 18,554 |
| Brazil..... | | | | | 16,811 | | 723,012 |
| British Honduras..... | | | | | 76 | | 50 |
| Canada..... | 1,318 | | 109 | | 3,535 | 12 | 66 |
| Canal Zone..... | | | | | 525 | | |
| China..... | | 4 | | | | | |
| Colombia..... | | | | | 24,292 | | |
| Costa Rica..... | | | | | 841 | | |
| Cuba..... | | | | | 407,206 | | 850 |
| Denmark..... | | | | | 100 | | |
| Ecuador..... | | | | | 1,572 | | |
| England..... | 14,722 | | 1,018 | 47,065 | 31,044 | 3,794 | 5,625 |
| France..... | 686,346 | | 132,467 | 339,703 | 147,439 | 7,586,632 | 30,210 |
| Germany..... | | | | | | | 82 |
| Guatemala..... | | | | | 8,206 | | |
| Holland..... | 1,695,254 | | 70,839 | 1,322,451 | 477,818 | 290,883 | |
| India..... | | | 45 | | 600 | | |
| Ireland..... | 18 | | | | | | |
| Italy..... | | | | 8 | | 1,909 | 932 |
| Jamaica..... | | | | | 12 | | |
| Japan..... | 9,599 | 2,172 | 2,436 | 14,513 | 62,064 | 5,712 | 3,686 |
| Mexico..... | | | | 10 | 3,060 | | |
| New South Wales..... | 2 | | | | | | |
| New Zealand..... | | | | | 190 | | |
| Nicaragua..... | | | | | 500 | | |
| Panama..... | | | | | 336 | | 2,840 |
| Philippine Islands..... | | | | | 4,304 | | |
| Portugal..... | | | | | 4 | | |
| Salvador..... | | | 26 | 8 | | | |
| Scotland..... | 10,056 | | 20 | 3,083 | 6,576 | 8,000 | |
| Spain..... | | | | | 867 | | |
| Straits Settlements..... | | | | | 66 | | |
| Trinidad..... | | | | 24 | 59,525 | | 83,809 |
| Venezuela..... | | | | | 8,423 | | |
| Total..... | 2,506,676 | 2,176 | 210,629 | 2,564,065 | 1,895,079 | 7,900,265 | 898,536 |

RESULTS OF STATE AND FEDERAL INSPECTION OF IMPORTED PLANTS AND PLANT PRODUCTS.

INSECT PESTS INTERCEPTED.

As the result of State and Federal inspection, the following pests were intercepted during the year: Egg masses of the gipsy moth on 6 different occasions on stock received from Belgium, France, and Japan. Nests of the brown-tail moth were detected on 6 consignments of nursery stock from France. Egg masses of the European tussock moth (*Notolophus antiqua*) have been repeatedly collected on stock from France, Holland, England, and Denmark. Pupæ of the dagger moth (*Apatela auricoma*) were reported on 12 shipments from Holland. An undescribed potato weevil was collected from Irish potatoes from Peru. This is the fourth potato weevil new to the United States found in potatoes imported from the Andes. The mango weevil (*Cryptorhynchus mangiferae*) was found in a small shipment of mango seed from Siam. This weevil is recognized as a serious pest to mangoes in many tropical countries. Cocoons of the pine sawfly (*Diprion simile*), which is an important pine pest in Europe, were detected on pines from Holland. A second sawfly (*Emphytus cinctus*) was collected on Manetti rose stock on 6 different occasions.

As in previous years, pear seedlings were occasionally found to be infested with the European pear scale (*Epidiaspis piricola*).

In addition to the pear scale, the following is a partial list of the more important scale insects collected on imported stock. The numeral following the country of origin indicates the number of times intercepted:

- Aonidia* sp. on condurango pods from Ecuador (1).
- Aspidiotus palmarum* on coconut from Honduras (1).
- Aspidiotus tsugae* on hemlock from Japan (2).
- Chrysomphalus personatus* on orchids from Canal Zone (1).
- Pseudaulnecia articulatus* on cinnamon from Jamaica (1); on *Pandanus* from Cuba (1); on *Areca* sp. from Trinidad (1).
- Targionia bifurcata* on orchids from Panama (1), Colombia (1), Guatemala (1).
- Targionia sacchari* on sugar cane from Cuba (1), and British West Indies (1).
- Chionaspis wistariae* on wistaria from Japan (1).
- Lepidosaphes lasianthi* on camellia from Japan (3).
- Lepidosaphes newsteadii* on umbrella pine from Japan (2).
- Parlatoria californiana* on olive from Greece (1).
- Parlatoria chinensis* on flowering shrub from China (2).
- Phenacaspis eugeniae* on ornamental plants from China (1).
- Antonina crawii* on bamboo from Japan (2).
- Asterolecanium aureum* on orchids from Isle of Pines (1).
- Lecanium bituberculatum* on *Crataegus oxyacantha* from Holland (1).

In addition to the above, many insects of greater or less importance have been taken on plants of various descriptions. In all, some 193 different kinds of insects have been reported on imported stock during the past year.

DISEASES INTERCEPTED.

Citrus canker has been found on 8 different lots of citrus and related plants—1 from the Philippine Islands, 2 from Java, 1 from Singapore, and 4 from Japan. This is apparently the first time that this disease has been reported from Java and Japan. Seven other diseases of more or less importance have been collected on citrus, appearing on 40 different lots of material. Some of these

diseases are not established in the citrus-growing regions of the United States.

Powdery scab has appeared in 17 lots of potatoes from Peru, 2 from Ireland, and 3 from England. The records from Peru are peculiarly interesting, since this disease occurred on wild potatoes from the east slope of the Andes and clearly indicate that Peru is the home of the powdery scab of the potato.

Nematodes have been detected on plants from France, Philippine Islands, Argentina, and China.

In all, some 116 specific diseases of which the causative organism was identified were detected on 185 different kinds of imported plants.

INSPECTION AT PLANT INTRODUCTION GARDENS.

All plant material distributed from Yarrow, Md., was examined and certified at the time of shipment by both entomological and pathological inspectors of the board. The plant material distributed from Chico, Cal., was examined by collaborators of the board. No shipments were made from Miami and Brooksville, Fla., except parcels containing dasheen tubers, chayotes, and fruit.

POTATO IMPORTATIONS.

Potatoes may be imported into the United States from the following countries: Denmark, Holland, Belgium, Cuba, Bermuda, and the Dominion of Canada, these several countries having made representations that adequate field inspection, conducted by recognized experts, have shown freedom from potato wart and other injurious potato diseases and insect pests and having further agreed to examine and certify all potatoes offered for export in compliance with the regulations governing the importation of potatoes into the United States. Canada, having agreed to offer for export into the United States only potatoes free from injurious diseases and insect pests, the examination and certification by the officials of the exporting country have been waived in accordance with the first proviso in regulation 2 of the Regulations Governing the Importation of Potatoes into the United States. All Canadian potatoes are, however, subject to inspection on arrival by an inspector of this board, and entry will be refused to any shipment of potatoes badly infested with disease, even though the disease is one which may already occur in the United States, such as common scab, dry rot, powdery scab, fusarium wilt, and black leg. Provision has also been made for the importation of potatoes from the states of Chihuahua and Sonora, Mexico, and from the island of Santo Domingo without foreign inspection and certification. Importations from Santo Domingo are admitted only through the port of New York, where they are inspected prior to entry. On account of the European war, very few shipments of potatoes were received from the three European countries named.

COTTON IMPORTATIONS.

The order referred to in the report for 1915, regulating the entry of cotton into the United States to guard against the introduction and possible establishment of the pink boll worm and other injurious cotton insects, and the regulations promulgated under said order, became effective July 1, 1915.

All cotton is imported under permit and the ports of entry are confined to the ports where special plants for the disinfection of cotton have been constructed. These ports are: Boston, Mass.; New York, N. Y.; Newark, N. J.; and San Francisco, Cal. The regulations provide further that no imported cotton may be distributed to any person, firm, or corporation not holding an unrevoked license to purchase or use such cotton. By means of a system of reports the board is able to locate until its consumption any bale of cotton imported since June 30, 1915. These regulations do not apply to cotton grown in and shipped from the States of Nuevo Leon, Coahuila, Durango, Chihuahua, Tamaulipas, and Lower California, Mexico.

In February it was brought to the attention of the board that a considerable amount of cotton waste was being imported. Certain grades of this waste, containing the seeds from as many as 20 bales of ginned cotton, are obviously much more dangerous than ordinary ginned cotton. The definition of the term "cotton," as used in the rules and regulations governing the importation of cotton into the United States, was promptly enlarged to include, in addition to ginned cotton, all grades of cotton waste. No disinfection, however, is required of grades of cotton waste resulting from processes in the manufacture of cotton which render it mechanically impossible for them to contain seeds, that is, those grades resulting from and subsequent to the carding machines, and there are no restrictions as to the ports through which such grades of waste may be entered.

Owing to the abnormal conditions obtaining in this country, due to the disturbed conditions in Europe, the completion of a suitable plant for the disinfection of foreign cottons was delayed until early in March. The regulations were then amended by providing that on and after March 10, 1916, all imported cotton must be disinfected at the port of entry as a condition of entry. In the meantime all users of imported cotton were required to screen and safeguard the warehouses in which the cotton was stored and the rooms in which the cotton was handled in the process of opening and cleaning and to destroy by burning all picker waste from such cotton. As now disinfected, the cotton in its original bales is placed in steel retorts accommodating from 50 to 200 bales of Egyptian cotton, and a vacuum of 25 inches is produced. Hydrocyanic-acid gas is then introduced into the retort and after a period of 15 minutes air is introduced into the retort until the vacuum drops to 5 inches. The cotton is then held in this mixture of air and gas for a period of 1 hour and 25 minutes. The mixture of air and gas is then exhausted and the cotton removed. A large series of experiments has demonstrated that the pink boll worm can not survive this treatment. The disinfection at all plants is carried out under the personal supervision of inspectors of this board.

The desirability of preventing the introduction of the pink boll worm into the United States is evidenced by the fact that the last cotton crop in the infested regions of Egypt was reduced about 25 per cent by this insect. The present law in that country is much more drastic than the rules and regulations governing the importation of cotton into the United States, notwithstanding the fact that Egypt is badly infested by the pink boll worm. The plan followed

by the board, however, of having all foreign cottons fumigated on arrival is undoubtedly the only plan which will sufficiently protect the cotton-growing interests of this country and at the same time not impose prohibitive restrictions on the importation and use of foreign cottons necessary in our industries.

The following table indicates the amount of cotton imported during the year and the amount of cotton waste imported since February:

Cotton imported from July 1, 1915, to June 30, 1916, in bales.

| Country of origin. | Ginned cotton. | Cotton waste. | Country of origin. | Ginned cotton. | Cotton waste. |
|----------------------|----------------|---------------|--------------------|----------------|---------------|
| Canada..... | | 625 | Japan..... | | 1,233 |
| Central America..... | 1 | | Java..... | 7 | |
| China..... | 35,964 | | Mexico..... | | 614 |
| England..... | | 18,167 | Peru..... | 22,695 | |
| Egypt..... | 244,687 | | Scotland..... | | 29 |
| Ecuador..... | 7 | | Santo Domingo..... | 199 | |
| Haiti..... | 5,503 | | Spain..... | | 497 |
| India..... | 6,902 | | United States..... | 284 | |
| Italy..... | | 4,093 | | | |
| Jamaica..... | 11 | | Total..... | 316,260 | 25,258 |

All ginned cotton imported since March 10, 1916, is subject to the disinfection requirement. Between March 10, 1916, and June 30, 1916, 119,965 bales were imported, 105,957 bales of which were disinfected on or before June 30, 1916.

Grades of waste resulting from and subsequent to the carding machine are not subject to the disinfection requirement. Between March 10, 1916, and June 30, 1916, 11,872 bales of such grades were imported.

Of waste subject to the disinfection requirement, 5,888 bales were imported between March 10, 1916, and June 30, 1916, 4,968 bales of which were disinfected on or before June 30, 1916.

During the fiscal year 207 packages, etc., of samples of ginned cotton and one package of samples of cotton waste were imported under permit.

The importation of cotton waste was brought under restriction in February, 1916. No record was kept of importations of waste prior to that time.

VIOLATIONS OF THE PLANT QUARANTINE ACT.

A number of small shipments of prohibited foreign plants and plant products were intercepted by customs officials and inspectors of this department, and in each instance the goods were either reexported or destroyed.

On April 11 a telegram was received from the collector of customs at Norfolk reporting that 189 tons of cotton seed from Lagos, West Africa, a part of the cargo of the British steamship *Appam*, brought to Newport News as a German prize of war, was to be sold by an order of the United States Admiralty Court at 10 o'clock the following day. The collector was promptly notified of the quarantine against foreign cotton seed, but the seed was sold to an oil mill in North Carolina, the sale being contingent on the approval of this department. The board, in cooperation with the Office of Markets and Rural Organization, promptly sent experts to Norfolk to safeguard the situation as far as possible. An examination of the seed revealed many traces of infestation by the pink bollworm. Immediate steps were taken to have the provisional sale set aside by the court. This was done as soon as the danger was explained. Several methods of disposing of the very large bulk of cotton seed were considered, with the result that the entire lot was placed in sulphuric acid vats as a preliminary to the conversion of the seed into fertilizer. As additional precautions, the two holds of the *Appam* which had contained the seed were fumigated with a strong dosage of sodium cyanide, and the dock at Newport News was thoroughly swept and

carefully inspected on several occasions to make certain that no scattered seeds remained. While every possible precaution was taken to prevent the introduction of this most serious cotton pest, a careful watch will be kept on the cotton fields in the vicinity of Norfolk during the season.¹ The prompt destruction of the seed after its presence in our waters was known, and the fact that the great majority of the insects had emerged during the long cruise of the *Appam* through the Tropics, very greatly reduced the danger.

REGULATORY INVESTIGATIONS.

The investigations necessitated in connection with our domestic quarantines were confined to a survey for the powdery scab disease of potatoes in the Gulf and Southern Atlantic States and in the States of Wisconsin, Minnesota, Washington, and Oregon, conducted by employees of the board, resulting in the lifting of the foreign and domestic quarantines on account of this disease; the completion of the investigation of the pink bollworm in Hawaii commenced last year by one of the entomological assistants of the Bureau of Entomology, as a result of which the cotton regulations were modified, and the annual scouting to determine the spread of the gypsymoth and the brown-tail moth in the New England States, leading to the quarantining of a number of additional towns on account of the gypsy moth and the elimination from the quarantine of a few towns included last year and which were found to be free this year.

LIST OF PLANTS AND PLANT PRODUCTS COVERED BY QUARANTINE.

The following is a complete list of the plants and plant products now under quarantine in accordance with the various notices of quarantine issued up to June 30, 1916:

FOREIGN.

Irish potatoes from Newfoundland, the islands of St. Pierre and Miquelon, England, Scotland, Wales, Ireland, Germany, and Austria-Hungary, on account of the disease known as potato wart. There are no restrictions on the entry of foreign potatoes into the island of Porto Rico.

Cotton seed (including seed cotton) of all species and varieties and cottonseed hulls from all foreign localities and countries except the States of Nuevo Leon, Tamaulipas, Coahuila, Durango, Chihuahua, and Lower California, Mexico, on account of the pink bollworm. Cotton seed (including seed cotton) of all species and varieties from the Mexican States mentioned may be imported under permit and bond for manufacturing purposes only. No restriction is placed on the use of cottonseed hulls imported from said States or which may be obtained from cotton seed imported from said States.

Seeds of avocado or alligator pear from Mexico and the countries of Central America, on account of the avocado weevil.

¹ Inspection conducted by the Bureau of Entomology of cotton fields within a radius of 20 or 25 miles of Norfolk in September, 1916, failed to show any signs of the pink bollworm.

Oranges, sweet limes, mangoes, *Achras sapotes*, peaches, guavas, plums, and grapefruit, and their horticultural varieties, from Mexico, on account of the Mexican fruit fly.

All citrus nursery stock, including buds, scions, and seeds, from all foreign localities and countries, on account of the citrus canker and other dangerous citrus diseases. The term "citrus" as used here includes all plants belonging to the subfamily or tribe *Citratæ*.

Living canes of sugar cane, or cuttings or parts thereof, from all foreign countries, on account of injurious insects and fungus diseases of sugar cane. There are no restrictions on the entry of such material into Hawaii and Porto Rico.

All five-leaved pines, currant, and gooseberry plants from the Dominion of Canada and Newfoundland; all five-leaved pines from Asia, and all pines from Europe, on account of the white-pine blister rust and the pine-shoot moth.

Seed and all other portions of Indian corn or maize, and the closely related plants of teosinte (*Euchlaena*), Job's tears (*Coix*), *Polytoca*, *Chionachne*, and *Sclerachne*, in the raw or unmanufactured state, from southeastern Asia (including India, Siam, Indo-China, and China), Malayan Archipelago, Australia, New Zealand, Oceania, Philippine Islands, Formosa, Japan, and adjacent islands, on account of the downy mildews and *Physoderma* diseases of Indian corn.

DOMESTIC.

Cotton seed and cottonseed hulls from Hawaii, on account of the pink boll worm.

Any fruit or vegetable from Hawaii upon which the Mediterranean fruit fly or the melon fly breeds, or which, from proximity of growth or the requirement of packing and shipping, may carry infestation, including alligator pears, bananas, carambolas, Chinese ink berries, Chinese oranges, Chinese plums, coffee berries, cucumbers, damson plums, eugenias, figs, grapes, grapefruit, green peppers, guavas, kamani nuts, kumquats, limes, loquats, mangoes, mock oranges, mountain apples, melons, Natal or Kafir plums, oranges, papayas, peaches, persimmons, pineapples, prickly pears, rose apples, star apples, string beans, squashes, and tomatoes, on account of the Mediterranean fruit fly and the melon fly, except that bananas and pineapples may be moved from the Territory of Hawaii in manner or method or under conditions prescribed in the regulations of the Secretary of Agriculture.

Cotton lint from Hawaii may be shipped to the continental United States only in accordance with the regulations prescribed in the notice of quarantine, on account of the pink boll worm.

Living canes of sugar cane, or cuttings or parts thereof, from Hawaii and Porto Rico, on account of injurious insects and fungus diseases of sugar cane.

Date palms or date-palm offshoots from Riverside County, Cal., east of the San Bernardino meridian; Imperial County, Cal.; Yuma, Maricopa, and Pinal Counties, Ariz.; and Webb County, Tex., shall be moved only in accordance with the rules and regulations applicable thereto, on account of two injurious scale insects, known as the *Parlatoria* scale and the *Phoenicococcus* scale.

(1) Coniferous trees, such as spruce, fir, hemlock, pine, juniper (cedar), and arbor vitæ (white cedar), known and described as "Christmas trees," and parts thereof, and decorative plants of the towns and territory quarantined for the gipsy moth (certain parts of New England), such as holly and laurel, known and described as "Christmas greens or greenery"; (2) forest plant products, including logs, tan bark, posts, poles, railroad ties, cordwood, and lumber; and (3) field-grown florists' stock, trees, shrubs, vines, cuttings, and other plants and plant products for planting or propagation, of the towns and territory quarantined for the gipsy moth (certain parts of New England), excepting fruit pits, seeds of fruit and ornamental trees and shrubs, field, vegetable, and flower seeds, bedding plants, and other herbaceous plants and roots, shall not be moved or allowed to move interstate to any point outside the quarantined towns and territory, or from points in the generally infested area to points in the lightly infested area, unless and until such plants and plant products have been inspected by the United States Department of Agriculture and certified to be free from the gipsy moth and the brown-tail moth.

Deciduous trees and shrubs, or such parts thereof as bear leaves, of the towns and territory quarantined for the brown-tail moth only (certain parts of New England), including all deciduous field-grown florists' stock, vines, cuttings, grafts, and scions, but excepting forest-plant products, such as logs, tan bark, posts, poles, railroad ties, cordwood, and lumber, shall not be moved or allowed to move interstate to points outside the quarantined towns and territory unless and until such plants and plant products have been inspected by the United States Department of Agriculture and certified to be free from the brown-tail moth. Coniferous trees and other evergreen trees are not covered by the brown-tail moth regulations.



